The gait pattern of an elite athlete with low vision: A case study

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Introduction: It is known that visual information during locomotion is essential for perceiving self-motion, limb position and limb movement [1] Some studies [1,2] have demonstrated specific differences in gait patterns between people with and without low vision. The objective of the present study was to evaluate the gait pattern adaptations that could be found in a professional athlete with visual impairments.

Patients/materials and methods: One paralympic athlete with low vision participated in the study. A VICON optoelectronic system was used to capture the trials with six cameras, sampling at 250 Hz. A total of 42 retro-reflective markers were attached to anatomical landmarks. Four gait cycles from each lower limb were captured from the subject.

Results: The non-parametric Mann–Whitney *U*-test showed significant differences between the present study and the Gillette Gait Index in adults data [3] ($p < 0.05$). The time of toe off (% gait cycle) and the time of knee peak flexion (% gait cycle) were significantly earlier than the times of gait cycle showed in GGI in adults. Some movements in sagittal plane, like the maximal hip extension, the knee flexion at initial contact, the maximal ankle dorsiflexion at stance and swing and the mean foot progression angle in stance showed values significantly lower than GGI in adults. The results also showed a significant difference in the hip movement at stance in the coronal plane.

Discussion and conclusions: The findings of this study showed that the gait pattern in low vision athletes could have adaptations in sagittal plane, such a less hip extension, less knee flexion at initial contact and less ankle dorsiflexion during swing and stance [2] There were found some others adaptations in coronal plane such an internal hip rotation at stance which altered the normal foot positioning [2] Although it is presumably that an elite athlete could have an optimal self-perception of motion, results showed that gait pattern was similar to the untrained people with visual impairments.

References

[1] Hallemans A, Ortibus E, Meire F, Aerts P. Low vision affects dynamic stability of gait. Gait & Posture 2010;32:547–51.

[2] Hallemans A, Beccu S, Van Loock K, Ortibus E, Truijen S, Aerts P. Visual deprivation leads to gait adaptations that are age-and context-specific: II. Kinematic parameters. Gait & Posture 2009;30:307–11.

[3] Creatual A, Bervet K, Ballaz L. Gillette gait index in adults. Gait & Posture 2010;32:307–10.

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